Expert searching in public health

By Kristine M. Alpi, MLS, MPH, AHIP
kalpi@att.net
Library Manager

Public Health Library
New York City Department of Health & Mental Hygiene
455 First Avenue, Room 1233
New York, New York 10016

Objective: The article explores the characteristics of public health information needs and the resources available to address those needs that distinguish it as an area of searching requiring particular expertise.

Methods: Public health searching activities from reference questions and literature search requests at a large, urban health department library were reviewed to identify the challenges in finding relevant public health information.

Results: The terminology of the information request frequently differed from the vocabularies available in the databases. Searches required the use of multiple databases and/or Web resources with diverse interfaces. Issues of the scope and features of the databases relevant to the search questions were considered.

Conclusion: Expert searching in public health differs from other types of expert searching in the subject breadth and technical demands of the databases to be searched, the fluidity and lack of standardization of the vocabulary, and the relative scarcity of high-quality investigations at the appropriate level of geographic specificity. Health sciences librarians require a broad exposure to databases, gray literature, and public health terminology to perform as expert searchers in public health.

INTRODUCTION

Access to evidence-based public health information is an area of growing interest and practice in health sciences librarianship. In 1997, the National Library of Medicine (NLM), along with the Centers for Disease Control and Prevention (CDC) and other agencies concerned with public health information, launched the project now known as Partners in Information Access for the Public Health Workforce, hereafter referred to as Partners [1]. The importance of access to quality information for public health decision making and program development is being explored by both librarians and public health professionals in this country and in other countries. Forsetlund and Bjørndal suggest that the potential in public health practice for more frequent and extensive use of research-based information is unrealized due to several barriers, such as lack of library access or technology and lack of time or funds. Furthermore, once practitioners have obtained the material, they may find it difficult to understand or not practically applicable [2, 3]. Expert searching is a key component of making essential information available to population health decision makers. Expansion of the role of expert searching is linked to the growing need for timely, quality information for evidence-based practice. The same emphasis on teaching evidence-based searching techniques to clinicians and medical students to perform evidence-based medicine searches has not yet been given to public health practitioners and students. Growth in public health literature on the importance of searching and identifying relevant papers for evidence-based public health practice is significant [4].

Evidence-based public health practice underlies the development of the *Guide to Community Preventive Services* under the leadership of the independent, nonfederal Task Force on Community Preventive Services. The task force makes recommendations for the use of public health programs and policies based on scientific evidence about what practices have worked to improve health. Briss et al. report that the task force ''thoroughly searches scientific literature for topic-relevant studies, evaluates their quality according to established criteria, and makes recommendations based on the overall strength of the body of evidence and the size and variability of reported effects'' [5]. The task force recommendations are published on the Internet [6], as well as in various journals such as the *American Journal of Preventive Medicine.* Some of the searches on

which the reviews were based appear to use the expertise of librarians, while others do not.

Library-based information specialists serve as project coordinators or partners of evidence-based public health projects. One Partners activity, the Healthy People 2010 Information Access Project, focuses specifically on evidence-based literature searching. Librarians and public health content experts join together to create preformulated MEDLINE search strategies to identify articles related to specific Healthy People 2010 objectives. Healthy People 2010 comprises a set of health objectives for the United States to achieve by the year 2010. States, communities, professional organizations, and others use these objectives to develop programs to improve health. A resource called DATA2010 from the National Center for Health Statistics provides data to measure progress toward these objectives [7]. The project coordinators report using ''evidence-based strategies,'' which they define as the following project characteristics [8]:

- draws its citations from the peer-reviewed literature available through PubMed
- is designed to yield more information on interventions and models than the extent or nature of problems addressed by a Healthy People objective
- ensures that all preformulated searches have been reviewed by Public Health Foundation staff or external subject matter experts to check that searches adequately capture most published literature (available through PubMed) related to achieving the objective
- provides links to relevant guidelines

The Evidence-Based Practice for Public Health Project at the Lamar Soutter Library of the University of Massachusetts Medical School represents an effort to examine the clinical evidence-based medicine models and assess their effectiveness for the public health literature [9].

The broad nature of public health makes it difficult to collect and manipulate a body of evidence-based literature to address public health information needs. In 1991, Chan and Carande described their efforts to transmit knowledge of public health searching through an expert reference advisory system [10]. Several components of the Medical Library Association's statement on expert searching relate particularly to the demands of public health searching [11]. An expert searcher in public health demonstrates the following:

- ability to identify and search resources beyond the electronically available published literature, including the older published literature, gray literature, unpublished information, and Web documents
- ability to recognize personal searcher limitations related to subject domain or resource specificity as well as the limitations of available institutional resources
- knowledge of database subject content, indexing or metadata conventions, and online record format knowledge to determine relevance to the information need and the method of retrieval access

These challenges in public health expert searching are further explored in the rest of this article.

PUBLIC HEALTH LITERATURE AND TERMINOLOGY

Public health is the practice of improving a population's health. Neighborhoods, schools, communities, or cities comprise a few of the measurable units of interest in population health. Fewer articles in the literature use communities as the unit of analysis than use individuals or other easier-to-measure units. Planning and executing studies on the neighborhood level is difficult and often expensive. Randomized controlled trials, the source of much knowledge in evidence-based medicine, are often impossible or unethical to conduct in some areas of public health, so a wider range of study designs appears in the public health literature [12, 13].

The number of group-randomized trials, studies in which groups are randomized rather than individuals, has increased. However, problems with the design and analysis of group-randomized studies remain [14]. Searchers cannot easily identify group-randomized trials. Expert searchers demonstrate knowledge of epidemiologic study designs and available publication types. Hayward et al. commented that the ''language of evidence presupposes the availability of appropriate information'' [15]. Important characteristics in public health expert searching are realism about types of evidence that might be available for a particular issue and flexibility in one's definition of evidence.

The places where people live, work, and carry out other activities are of great importance in public health. Specific journals, such as *Health and Place,* even examine how geography affects health. Likewise, relationships between people and collaborations among organizations are necessary to achieve improved public health outcomes. Many searches in public health contain a place or partnership component. Controlled vocabularies in health databases do not capture the importance of place and partners well. For example, in Medical Subject Headings (MeSH), the terms ''neighborhood,'' ''community,'' ''place of birth,'' ''living arrangements,'' and ''domicile'' are all entry terms mapping to the MeSH term ''Residence Characteristics,'' which is defined as ''Elements of residence that characterize a population. They are applicable in determining need for and utilization of health services'' [16]. This term does not allow the sort of place distinctions that are useful to public health practitioners at the local level. For example, a specialist in preventing lead poisoning might want to distinguish between literature on lead exposure in the home versus the neighborhood as a whole. Available terms such as ''Urban population'' and ''Urban health'' are inconsistently applied. The lack of terms for typical public health partners such as ''community based organizations'' provides another example of the mismatch between typical searching requests of a local public health agency and the way the public health literature is indexed.

Public health papers are dispersed across a wide variety of journals in many disciplines. The journal list compiled for the Evidence-Based Public Health Prac-

tice Project cites 706 journals relevant to public health. Another project, the Core Public Health Journals Project of the Public Health/Health Administration Section of the Medical Library Association, lists a smaller set of journals [17]. Most libraries serving public health practitioners—public health libraries, federal libraries, state libraries, city libraries, public libraries, and public hospital libraries—do not have the budgets to support the wide-ranging serials collection that would be needed. For example, the Public Health Library of the New York City Department of Health and Mental Hygiene currently subscribes to 174 journals and relies on interlibrary loan a great deal. Knowing how to quickly locate materials in multidisciplinary full-text databases is important to public health searching. Local and national news and legal sources expand the range of required searching techniques and knowledge. Unfortunately, many newspaper Websites still do not have extensive archives or advanced search engines, and many local health codes are not available on the Web.

Many of the journals carrying articles relevant to public health concerns are not indexed by MEDLINE or other databases frequently used by health sciences librarians. New journals in areas of interest to public health spring up all the time; for example, in the area of emergency preparedness, several new journals—such as *Biosecurity and Bioterrorism: Biodefense Strategy, Practice, and Science; Journal of Homeland Security and Emergency Management*; and *International Journal of Disaster Medicine*—need to be tracked or searched with every request. Indexing in MEDLINE for *Biosecurity and Bioterrorism* began in March 2004. Literature reviews in public health cannot be limited to database searches. In describing the systematic review process for an occupational injury project, Beahler et al. reported that much of the literature was not well indexed, and, therefore, librarians employed information retrieval methods other than database searching to retrieve relevant literature [18]. A study of optimum literature retrieval strategies for technology assessment reports by Royle and Waugh found that searching nondatabase sources such as submissions from manufacturers and recent meeting abstracts, contacting experts, and checking reference lists appear to be productive ways of identifying further studies [19].

Most databases lack standard terminology in public health. The relatively new Public Health Information Thesaurus is used in the United Kingdom to index the databases HealthPromis, the Health Development Agency Evidence Base, and the Public Health Electronic Library. Public Health Information Thesaurus is based on the Multilingual European Thesaurus on Health Promotion, a European Commission project to standardize terms used in the field of health promotion across the European Union [20]. Many databases that are useful to public health have their own thesauri. Some of these are freely available online or available for purchase in print: National Institute on Alcohol Abuse and Alcoholism's Alcohol and Alcohol Problems Science Database (ETOH), ''Alcohol and Other Drug (AOD) Thesaurus''; AGRICOLA, ''NAL Agricultural Thesaurus''; ERIC, ''Thesaurus of ERIC Descriptors''; POPLINE, ''User's Guide to POPLINE Keywords''; or AgeLine, ''Thesaurus of Aging Terminology.'' Others are only available as part of a paid subscription: EMBASE, ''EMTREE: The Life Science Thesaurus''; PsycINFO, ''Thesaurus of Psychological Index Terms''; or the BIOSIS Controlled Vocabulary.

Terms used by public health professionals often differ greatly from terms available for indexing. In PubMed, an issue also exists with disambiguating between keyword searches and journal titles [21]. A keyword search for the concept ''tobacco control'' illustrates both of these issues. When the concept is searched as an unqualified term, PubMed retrieves only citations from the journal *Tobacco Control.* When it is qualified as a text-word, the retrieved articles are primarily indexed with terms such as smoking, smoking cessation, tobacco, and tobacco industry. NLM has been working with the Partners' project organizations and others to improve MeSH in the area of public health. It can take a long time to get new terminology added to a thesaurus, an effort requiring advocacy on the part of librarians and public health professionals.

One of the roles of expert searchers should be to point out these gaps and advocate for improved indexing. Addressing indexing gaps would improve public health searching. For example, public health students are often required to search for interventions based on particular theories, but individual theories or models are not available as indexing terms in many databases. CINAHL includes individual nursing theories as part of its controlled terminology, but more theories and models from education and the social sciences would be valuable. Many items (population characteristics, residence characteristics, etc.) of interest to students, researchers, and practitioners are not index terms. General topic databases and news databases often have minimal or only high-level indexing.

Gray literature, another area in which the lack of indexing is a problem, is very important to expert searching in public health. Gray literature comprises information that is created and distributed to disseminate knowledge but is not generally produced or marketed by commercial publishers. The New York Academy of Medicine Library catalogs gray literature from more than 175 organizations and, since 1999, has produced a quarterly *Grey Literature Report* [22]. Gray literature is often the only information available on a topic from a particular perspective or type of organizational source. Although much of this information may be available on the Web, it may not be easy to locate or may require registration to access. Even when reports are cataloged by libraries, they still may not be easily located by users or expert searchers. Product inserts and other commercial forms of gray literature also need to be located, especially in areas such as pest management, food safety, and poison control.

Meeting abstracts are an important tool in public health, especially for identifying research on hot topics and contacts from whom to obtain further program information. While the NLM Gateway provides excel-

lent coverage of HIV/AIDS-related meetings, many other areas of public health, for which meeting coverage is essential, are not covered. Many conferences such as the annual meeting of the American Public Health Association make their abstracts available online, but it is not clear how long those collections of abstracts will remain available and each year must be searched separately. Biological Abstracts/RRM (reports, reviews, meetings) covers meetings in infectious diseases and laboratory science extremely well, but many libraries serving the public health workforce are not able to afford this database. Prepublication releases and emailed journal table of contents can help keep searches up to date.

DATABASES AND ACCESS TO LITERATURE

Public health searching requires a wide range of databases on specific topics for a variety of audiences. The range of databases regularly used in a public health library covers topics as diverse as aging, early intervention, transportation, workplace safety, and zoonotic diseases. Examples of this diversity appear in lists of the databases searched for systematic reviews in the area of injury [18] and health in the ''built environment.'' Built environment is a term used in public health describing the living and working environment, consisting of buildings, roads, fixtures, parks, and all other adaptations that form the physical character of an area. Weaver's review of the built environment literature used thirty databases covering many disciplines—including medicine, social science, architecture, science, engineering, environment, planning, and psychology—and found that excluding gray literature and databases related to the built environment would have resulted in the loss of 10% of all research studies included in the review [23]. Not all public health searching requires a systematic review, but the development of new programs and the evaluation of existing programs benefit from a thorough review of the literature.

Even the most experienced searchers might not be aware of all the databases potentially relevant to a search request. Overview articles and book chapters are occasionally published to highlight key databases in a particular discipline. Toxicological databases have been covered well by both articles [24] and Wexler's book, *Information Resources in Toxicology* (Academic Press, 2000). It is beyond the scope of this article to address resource lists for all the topic areas. The Evidence-Based Practice for Public Health Project <http://library.umassmed.edu/ebpph/alldbs.pdf> offers a list of 189 databases that are useful in searching for public health information. The expert searcher in public health creates a network of colleagues with whom to consult about requests. For example, a librarian with requests for emergency preparedness information would maintain regular contact with librarians with collections and expertise in police and fire information seeking. These contacts can be useful in identifying additional databases, key terminology, access to databases, and sources for materials identified during the search. Because the majority of specialty databases or Websites are used infrequently, the learning curve can be steep. The move away from subject matter databases, such as AIDSLINE and TOXLINE Special, reinforces the need for searchers to remain familiar with multiple databases with disparate vocabularies. Transitioning public health users from aggregate subject databases in their particular field to searching the NLM Gateway for its multiple components has not been easy.

Awareness of a potential database to be searched is just the beginning. The searcher must assess whether the time and cost to perform the search will pay off in terms of the additional information it will yield. Many of the government-funded databases are freely available. However, the search interfaces and engines are not standardized, and, therefore, multi-file searching is generally not possible. Materials are routinely broken up by format; for example, the National Criminal Justice Reference Service (NCJRS) has two databases, an abstract database and a full-text database. Some databases such as Policy Information Exchange from the Missouri Institute of Mental Health are designed as full-text databases for easy access to information. The methods offered to select and print or export the relevant records from most free databases are often minimal.

Searching these free databases has a significant time cost in both the search time itself and the time to process and tie together the results. Even the databases with the most functionality have limitations. For example, PubMed lacks the individual word and true adjacency searching needed to find particular words and phrases of interest. Searches of commercial systems that provide standard search fields, cross-database searching, a wide range of databases, and convenient output mechanisms might be beyond the budget of public health organizations. Obtaining access to certain expensive databases, such as EMBASE or Chemical Abstracts Service, for an occasional search can be particularly difficult. As with most libraries, budgets for databases are limited, and quick one-time purchasing of access is not possible in most public health settings. Coordinating with other public service agencies such as police, fire, and medical examiners' offices for the occasional use of databases in these disciplines, such as Forensic Science Service (FORS) or Fire Worldwide, may be possible. Knowing the news, business, and general reference databases available through the local public library can be important to fulfilling certain needs in public health, especially in areas such as workplace wellness and operations.

Technological limitations are also still an issue and one that the expert searcher might not be able to resolve. Firewalls and restrictions on sites using Java or other programs can limit access to key resources such as databases and other library catalogs. The searcher may need to be on site at a particular location to access a locally subscribed specialty database. Staff located at clinics, satellite facilities, or other sites such as schools

or hospitals may not have access to the databases, or the databases may be needed on handheld computers for when staff is out in the field.

For the public health expert searcher, finding the reference is just the beginning. Obtaining the document—whether by using interlibrary loan, contacting other agencies or the author, or purchasing directly from the publisher—is important to completing the search. Many government-funded databases include information about how to obtain items. Document delivery of items in ERIC and NCJRS are available via paid clearinghouses, and ERIC documents are available through OCLC. Many items in NCJRS are not easily available through traditional interlibrary loan. Libraries would benefit from being able to purchase online reports and individual articles with credit cards, as this is often the only way to obtain some gray literature.

The issue of the searcher's or staff's time becomes important in the effort to obtain unusual materials. Locating presentations and reports by authors and organizations is occasionally easy, but often it is impossible. Many reports mentioned in news articles are not made publicly available. Online licenses frequently restrict document delivery from the online version of a journal. In the case where libraries cannot provide an article due to its not yet having been received, the email addresses listed in the PubMed author affiliation field are helpful in requesting articles directly from authors. The Health & Human Services (HSS) Employee Directory <http://directory.psc.gov/employee.htm> is useful for locating contact information for CDC and other HSS employees who have authored papers but for whom contact information is not available on the agency Website.

PUBLIC HEALTH EXPERT SEARCHING PRACTICE

Expert searching in public health is definitely not going away. At a time when many academic libraries report the number of searches dwindling, search requests in public health flourish. The public health workforce is required to produce better outcomes with fewer resources, and librarians definitely have a place assisting in bringing evidence-based and other types of information to bear on public health practice. A 1996 article on the end users' utilization of MEDLINE in a UK public health department categorized searches that were done in a six-month time period. The three main categories were interest and education (37%), practical service inquiries (31%), and specific public health projects (25%) [25]. Today, few public health workers seem to have time to explore a topic for interest and education.

The diversity of intended audiences challenges public health searchers. Many searches are done for committees or projects with a wide range of member representation—from consumers, to politicians, to professors. Reference interviews are often quickly conducted over the telephone or through email. The request is often filtered down through many levels, and the requestor may have changed or not captured the original intent. Depending on the requestor's background and training, they might not be familiar with the databases, literature, and terminology of the discipline about which they are requesting information. The needed information may be clinical data, legal testimony, best practice programs, grant sources, or media campaigns.

Timing is often an issue, for example, with rush requests in response to political or media pressures. Health departments are perceived as authorities, so all information must be reliable and vetted. There is always a tradeoff between the need to be comprehensive and the need to meet time constraints. The issue of keeping up with an area once the initial search is completed also needs to considered. Although clients may not specifically request it, it may be valuable to set up a selective dissemination of information (SDI) search on the topic of the request and then pass the new information on to requesters, in case they are still working on the projects. Expert searchers should consider being proactive about asking leaders and program managers about the need to keep up with the literature in their areas of expertise. Another way to showcase the utility of searching skills is to monitor the publications of the department staff by author name and affiliation.

The ever-growing variety of databases and Websites makes it difficult to maintain a consistent level of expertise across resources. Databases that provide extensive help screens or quick tutorials to orient infrequent users will be used more effectively. One component to keeping up is visiting or receiving updates on new resources. The Scout Report and the Librarian's Index to the Internet are two examples of updating services. They have introduced such gems as the Legacy Tobacco Documents Library <http://legacy.library.ucsf.edu>, Published International Literature On Traumatic Stress (PILOTS) <http://www.ncptsd.org/publications/pilots/>, and the catalog of the Library of the National Memorial Institute for the Prevention of Terrorism <http://www.mipt.org/library.asp>. The newsletter of the Public Health/Health Administration Section of the Medical Library Association <http://www.phha.mlanet.org> also profiles new or improved public health resources. Librarians wishing to develop their searching expertise can also consider spending time exploring interface commonalities and differences in search systems; gaining familiarity with the database's content, temporal, and geographic scope; signing up for alerts about the content and design changes to databases; and suggesting improvements to vocabulary, journal indexing coverage, or interface design of databases to make them easier to use and more relevant in the future.

DEVELOPING FUTURE SEARCHERS

Expert searchers in public health explore databases across a wide variety of disciplines in their training or practical experience. Almost all librarians in training

take a general reference or online searching course, but the databases covered vary significantly depending on the instructor, the program, or the resources of libraries available to the student. Most students of library or information sciences will at least have had exposure to ERIC and PsycINFO. Experience working in nonmedical libraries is an asset to public health searching. Working on the reference desk at a large university library provides exposure to a wealth of databases from AgeLine, to EconLit, to ERIC, to Public Affairs Information Service (PAIS), to Water Resources Abstracts. Hospital librarianship practice provides opportunities for expert searching in clinical databases such as MEDLINE, CINAHL, and PsycINFO and business and news databases. Experience in any sort of information-seeking organization can strengthen searching knowledge. The expert searching columns in the *MLA News* have introduced more of these specialty databases, as have several continuing education courses available through the Medical Library Association.

Exposure to the information-seeking practices of politicians, basic scientists, health educators, physicians, economists, and consumers is critical. Reading about them is one approach; observing and assisting them is another. The information needs of the public health workforce are incredibly diverse. As knowledge of evidence-based health searching grows, expert searchers will play an increasingly important role as guides, consultants, and purveyors of information. The most important characteristic for an expert searcher in public health is the willingness to continually and quickly develop expertise in new subjects and resources as public health priorities change.

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